REMARKS

Claims 1-20 are pending in the present application. In the Office Action mailed November 13, 2008, the Examiner rejected claims 1, 3, 6, and 7 under 35 U.S.C. §102(b) as being anticipated by Meyer et al. (USP 5,233,301). The Examiner next rejected claim 2 under 35 U.S.C. §103(a) as being unpatentable over Meyer et al. Claims 1-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Foo (USP 5,429,134). Claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Foo et al. (USP 6,498,946).

Claim Amendments

Claims 1, 15, and 16 have been amended to clarify the invention.

Claim Rejections Under 35 U.S.C. §102(b)

Considering claims 1, 3, 6, and 7, the Examiner rejected the claims under 35 U.S.C. §102(b) as being anticipated by Meyer et al. (USP 5,233,301). With respect to claim 1, the Examiner stated that "Meyer discloses a pulse sequence which involves defining a set of user selected imaging parameters such as the spatial slice width and a spectral component of the object to be imaged," and that "[t]wo or more excitations (train of alpha pulses) are then selected depending on the desired slice width and which tissue is to be suppressed and applied after a simultaneously spatial and spectrally selective pulse…" *Office Action*, November 13, 2008, pp. 2-3. However, regardless of Applicant's amendment to claim 1 herein, Applicant respectfully disagrees with the Examiner's rejection. First, claim 1 calls for, in part, "identifying a set of user-selectable imaging parameters for prescribed MR data acquisition of a targeted tissue…" *See Claim 1*, (emphasis added). Nowhere in Meyer et al. is it specifically set forth that spatial slice width and the spectral component to be imaged are "user-selected." In fact, Meyer et al. states that "[i]n accordance with the present invention, excitation k-space is covered in two or more excitations to reduce MRI slice width and/or improve slice image profiles." Meyer et al., Col. 2, lns. 49-51. As such, slice width is not a "user-selectable imaging parameter" in Meyer et al., but is instead determined based on the excitation k-space coverage.

Additionally, claim 1 further calls for, in part, "setting a length of a train of alpha pulses of a gradient echo sequence specific to the user-selected imaging parameters..." *See Claim 1*, (emphasis added). As noted above, the Examiner alleged that Meyer et al. teaches that "[t]wo or more excitations (train of alpha pulses) are then selected depending on the desired slice width and which tissue is to be suppressed…" *Office Action*, supra at 2-3. However, Meyer et al. shows

that it is the shape and period of the excitation pulses that determine the desired slice width, and nowhere is a "length of a train of alpha pulses" set, as is called for in claim 1. *See Meyer et al.*, Col. 4, ln. 52 – Col. 6, ln. 25, Figs. 4A-5D. Referring to Figs. 4A, 4C, 5A, and 5C, Meyer et al. does not show that a length of a train of alpha pulses is set, but merely shows that the period and shape of the pulses is altered to achieve a reduction in slice width. *See Id.* Conversely, Applicant shows that the number of pulses of each train of alpha pulses (74) is set dependent upon the particular imaging parameters selected by a user, such imaging parameters being TR, receiver bandwidth, x-resolution, T_1 of the suppressed tissue, and alpha pulse flip angles. Setting the length of a train of alpha pulses in this manner allows for optimal tissue suppression while shortening acquisition times. *See Specification*, Paras. [0029-0030], Fig. 2. Thus, Applicant sets the length of a train of alpha pulses based on user-selected imaging parameters to provide the most effective tissue suppression, while Meyer et al. merely alters the shape and period of the pulses to achieve a reduced slice width.

In view of the above arguments, Applicant believes that the Examiner has failed to show that Meyer et al. teaches each and every limitation of claim 1. The MPEP states that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference." *See MPEP 2131.* As Meyer et al. cannot be shown to teach each and every element called for in claim 1, Applicant believes that the rejection of claim 1 under 35 U.S.C. §102(b), along with all claims dependent therefrom, must be withdrawn.

Claim Rejections Under 35 U.S.C. §103(a)

The Examiner next rejected claims 1-20 under 35 U.S.C. §103(a) as being unpatentable over a single reference--Foo (USP 5,429,134). While the Examiner rejected all claims in view of Foo '134, the rejection merely addressed the subject matter of independent claim 8 and dependent claims 9-14. As the Examiner has failed to specifically address the limitations of claims 1-7 and 15-20, Applicant believes that any additional rejection of these claims in view of Foo '134 must be made non-final to allow Applicant a reasonable opportunity to respond to the Examiner's explanation of these rejections. However, regardless of the insufficient support provided for the rejection of claims 1-7 and 15-20, Applicant nevertheless believes that Foo '134 cannot be shown to teach or suggest the limitations of claims 1-20, as will be set forth below.

Considering claim 8, the claim calls for, in part, "a computer programmed to: determine a null point of tissue to be suppressed; determine a time interval for longitudinal magnetization of the tissue to recover to the null point; and from the time interval, determine a number of alpha

pulses to be applied after each inversion pulse in a gradient echo pulse sequence." *See Claim 8*. In supporting the rejection, the Examiner stated that:

> "Foo '134 does not explicitly disclose determining the null point and the time interval for the longitudinal magnetization of the tissue to recover to the null point, however the system of Foo '134 wants to make the longitudinal magnetization of the suppressed tissue to pass through the zero at the centers of the alpha pulses (col. 26-32). In order to make the null point be at the center of the pulses, it is obvious that these values must be known so that the calculations can be made manipulate (sic) the pulses to make certain that the null falls through the middle of them."

Office Action, supra at 4. Applicant respectfully disagrees. Foo '134 does teach that "[t]he longitudinal magnetization M_z of fat is indicated by the curve 217, and it can be seen that the magnetization M_z passes through zero at 219 and 220, which are aligned at the centers of the respective groups 210 and 212." *Foo '134*, Col. 5, lns. 26-30, Fig. 2. Thus, Foo '134 effectively teaches that the null points (points 219 and 220) coincide with the centers of the groups of RF excitation field pulses 201. *Id.* at Fig. 2. However, this alone does not make it obvious to one of ordinary skill in the art that "a time interval for longitudinal magnetization of the tissue to recover to the null point" is determined, and that from that time interval, "a number of alpha pulses to be applied after each inversion pulse of a gradient echo pulse sequence" is determined, as is claimed. In fact, Foo '134 specifically teaches that the number of alpha pulses (or RF excitation field pulses 201) to be applied is chosen for reasons unrelated to the time interval for longitudinal magnetization to recover to the null point. Foo '134 states that "(e)ight (n=8) fast gradient echo view segments are nominally chosen to constitute a group as this provides a compromise between the motion averaged temporal resolution of each image (defined as the time needed to acquire data from a group of n view segments), and the total image acquisition time." *Id.*, Col. 5, lns 2-7, Fig. 2. As such, Foo '134 specifically sets forth why eight fast gradient echo view segments (and thus eight RF excitation field pulses 201) are chosen, and the time interval for longitudinal magnetization of the tissue to recover to the null point is not the reason. Thus, the Examiner's statement that the pulses are manipulated "to make certain that the null falls through the middle of them" is in direct contradiction to the teachings of Foo '134 with respect to the determination of a number of alpha pulses. Accordingly, Applicant respectfully requests that the rejection of claim 8 in view of Foo '134 be withdrawn, along with the rejections of all claims dependent therefrom.

With respect to independent claim 1, as noted above, the Examiner failed to address the specific limitations of the claim, and also did not specify where or how Foo '134 allegedly disclosed the limitations. Applicant believes that Foo '134 cannot be shown to teach or suggest that which is called for in claim 1, and one of ordinary skill in the art would not have been motivated to alter the method of Foo '134 to teach the claimed limitations. In particular, claim 1 again calls for, in part, the step of "setting a length of a train of alpha pulses of a gradient echo sequence specific to the user-selected imaging parameters..." *See Claim 1*. As discussed above with respect to claim 8, Foo '134 clearly identifies that a length of a train of alpha pulses (or RF excitation field pulses 201) are "nominally chosen to constitute a group as this provides a compromise between the motion averaged temporal resolution of each image (defined as the time needed to acquire data from a group of n view segments), and the total image acquisition time." *Foo '134*, Col. 5, lns 2-7, Fig. 2. The setting of the number of RF excitation field pulses 201 in this manner is clearly not the same as setting the length of a train of RF excitation field pulses "specific to the user-selected imaging parameters," as is called for in claim 1. Accordingly, the Examiner has failed to show how Foo '134 teaches or suggests the limitations of claim 1, and as such, Applicant requests that the rejection to claim 1 under 35 U.S.C. §103(a) over Foo '134 be withdrawn.

As to independent claim 15, Applicant does not believe that Foo '134 teaches or suggests the original claim limitations. The claim has been amended to further clarify the invention. Support for this amendment can be found in Paras. [0028-0030] of Applicant's Specification. Claim 15 now calls for, in part, an MRI apparatus employing a pulse sequence, wherein the pulse sequence comprises "a number of RF alpha pulses played out by the MRI apparatus during each TR period, wherein a portion of the alpha pulses is played out prior to zeroing of longitudinal magnetization of a tissue targeted for evaluation in the MRI apparatus, and wherein the number of RF alpha pulses played out during each TR period is modified based on the flip angle of the inversion pulse for each TR period." *See Claim 15*, (emphasis added). Once again, Foo '134 merely teaches that the series of eight RF alpha pulses (or RF excitation field pulses 201) are selected "to constitute a group as this provides a compromise between the motion averaged temporal resolution of each image (defined as the time needed to acquire data from a group of n view segments), and the total image acquisition time." *Foo '134*, Col. 5, lns 2-7, Fig. 2. Thus, nowhere does Foo '134 teach or suggest that the number of RF alpha pulses played out are "modified based on the flip angle of the inversion pulse for each TR period," as is now called for

in claim 15. As such, Applicant believes that the rejection to claim 15 under 35 U.S.C. §103(a) over Foo '134 must be withdrawn.

Considering independent claim 17, the Examiner again failed to address the specific limitations of the claim in making the rejection in view of Foo '134. Regardless of this, Foo '134 cannot be shown to teach or suggest the limitations of claim 17. Claim 17 calls for, in part, a computer program that when executed by a computer causes the computer to "on-the-fly, determine a number of alpha pulses to be applied after the spectrally selective inversion pulse such that alpha pulses are applied before and after longitudinal magnetization of the targeted tissue reaches zero." *See Claim 17.* As noted above with respect to claims 1, 8, and 15, Foo '134 states that "(e)ight (n=8) fast gradient echo view segments are nominally chosen to constitute a group as this provides a compromise between the motion averaged temporal resolution of each image (defined as the time needed to acquire data from a group of n view segments), and the total image acquisition time." *Foo '134,* Col. 5, lns 2-7, Fig. 2. Accordingly, Foo '134 does not teach that the number of alpha pulses to be applied are determined "on-the-fly" and subsequent to the determination of the flip angle of the spectrally selective inversion pulse, as is claimed. Instead, Foo '134 merely discloses that the number of alpha pulses to be applied are determined *prior* to the calculation of the flip angle of a spectrally selective inversion pulse. *See Id.*, Col. 5, lns. 2-63. As such, Foo '134 again cannot be shown to teach or suggest that which is called for in independent claim 17. Applicant therefore believes that the rejection to claim 17 under 35 U.S.C. §103(a) over Foo '134 should be withdrawn, as should the rejections to claims 18-20 dependent therefrom.

The Examiner also maintained the rejection to claim 8 under 35 U.S.C. §103(a) as being unpatentable over Foo et al. (USP 6,498,946). In making the rejection, the Examiner stated that "[a]lthough Foo '946 does not explicitly state determining the time interval and the number of pulses, in order to perform the timing execution, these factors must be known or else too few or too many excitation pulses could be applied and the desired result of reaching the null point will not be achieved (col. 2, line 5-12)." *Office Action,* supra at 5. However, the Examiner's blanket statement that the time interval and the number of pulses (presumably alpha pulses) "must be known" still does not show that it would have been obvious to one of ordinary skill in the art to have determined, "from the time interval," the number of alpha pulses to be applied after each inversion pulses, as is claimed. In fact, as discussed above with respect to Foo '134, the number and timing execution of alpha pulses (or RF excitation pulses) to be applied may be determined irrespective of the time interval for longitudinal magnetization of the tissue to recover to the null

point, even if that time interval is known. Thus, the Examiner has failed to show how or why it clearly would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Foo '946 to teach each and every limitation of claim 8. As such, Applicant respectfully requests that the rejection to claim 8 over Foo '946 be withdrawn.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-20.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

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General Authorization and Extension of Time

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 07-0845. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 07-0845. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 07-0845. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 07-0845.

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